



Dietary Exposure

Developing Models to Predict Dietary Intake of Pesticides

Identifying Exposure Pathways

The pesticides used to protect food from pests often remain as a residue on the food products that are prepared, served, and consumed in the home. Dietary models developed by NERL are being used that identify the importance of diet as a pathway for human pesticide exposure. NERL's goal is to reduce the level of uncertainty in dietary exposure assessments by improving the ability to predict dietary intake of pesticide residues, particularly to indicate the potential for high exposures of certain populations. The Food Quality Protection Act establishes tougher standards for pesticide use on food and requires improved exposure assessments for children.

Improved Dietary Exposure Potential Model

NERL has developed a model and database system, the Dietary Exposure Potential Model (DEPM), to correlate food consumption and contaminant residue data from the national-scale food monitoring programs that are normally used for nutrition and regulatory monitoring. DEPM allows dietary exposure estimates to be made and prioritizes highly consumed and highly contaminated foods for use as guidance in exposure measurements. Improvements to the DEPM include updating recipe files to include tapwater as a food ingredient and upgrading databases to include more chemicals and additional residue data. Daily intakes for over 300 pesticides and environmental contaminants can be estimated, including identification of foods potentially implicated in total ingestion of disinfection by-products from tapwater. DEPM is used to predict food groups and items with the highest amounts of certain pesticides. The DEPM provides the exposure research community a valuable tool for the utilization of existing food-related information in evaluating the potential for dietary exposures.

Food Handling Increases Dietary Exposure of Young Children

The Food Quality Protection Act of 1996 requires improved exposure assessments for children. NERL's goal to reduce the level of uncertainty in dietary exposure has led to the development of a model based on the total characterization of children's dietary intake of pesticides. This characterization includes three major contributing factors.

1. Existing pesticide residues on food.
2. Contamination via food contact with contaminated surfaces.
3. Contamination by hand contact with contaminated surfaces, then from hand to food.



Measurements revealed that pesticides transferred to food caused by contact with surfaces and handling by a child would increase dietary intake significantly. Handling of food by a child's contaminated hand accounted for over 60 percent of the excess pesticide intake. Characterizing this transfer of contaminants assists the exposure assessor in determining actual dietary intakes.

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Benefits

- DEPM allows the use of existing consumption and contaminant residue databases for predicting dietary intake of contaminants.
- Models aid in the identification of sources of exposure and estimates of the dietary role of exposure to contaminants.
- Correlation of food consumption patterns with pesticide residue data allows exposure analysts to estimate daily exposure by demographic factors, such as age, gender, region, ethnic group, and economic status.
- Identification of critical input factors, such as how food is handled, allow better characterization of childrens' dietary exposures.

Purpose

- Supports EPA's goal to reduce the level of uncertainty in exposure assessments.
- Aids in the fulfillment of the Food Quality Protection Act that requires improved exposure assessments for children.
- Provides better tools to assist exposure assessors in determining actual dietary intakes.
- Identifies the importance of diet relative to other exposure pathways.

Accomplishments

- Identified and measured exposure factors that are critical to understanding dietary exposures of children.
- An improved NERL Dietary Exposure Potential Model.

Participants

- U.S. Environmental Protection Agency, Office of Research and Development, National Exposure Research Laboratory, Cincinnati, OH.



Improved Dietary Exposure Potential Model

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Handling of Food by Young Children

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For More Information:

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